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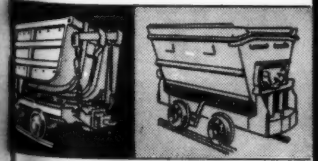
The Mining Journal

LONDON, SEPTEMBER 4, 1959

Vol. 253. No. 6472. Price Ninepence



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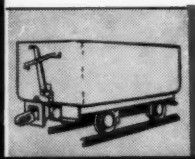

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The Mining Journal

London, September 4, 1959

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Vol. 253 **No. 6472**

Established 1835

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Published each Friday by

THE MINING JOURNAL LTD.

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15 WILSON STREET, LONDON, E.C.2

Telegraphic Tutwork London
Telephone MONarch 2567 (3 lines)

Annual Subscription £3 5s. Single copy ninepence

U.S. Minerals Policy

IN our issue of June 12, 1959, under the heading " Why Flog Such a Good Investment," we referred to the conflict which appeared to have arisen between the United States Administration and the Senate on the issue of whether the national stockpile should be reduced or frozen. Much attention has since been accorded by Congress to the highly controversial subject of stockpile surpluses and their disposal. However, no Congressional directive establishing a definite policy for future disposals of " excess " supplies of metals and materials from U.S. Government stockpiles has emerged from this session. Despite attempts by the House of Representatives and the Senate to set up such a policy, the uncertainties overhanging the commodity markets have by no means been dispelled.

A bill giving the Office of Civil and Defence Mobilization (OCDM) $108,000,000 to meet cash requirements of the Defence Production Act (DPA) stockpile inventory for operations in the fiscal year 1960 (which began last July 1) has moved closer to becoming law. Known as the Supplemental Appropriations Act, it has been passed by the House and Senate and awaits the President's signature. It appropriated $977,345,608 in new funds to cover operating expenses of a number of Federal Government Departments, including OCDM and its purchasing and selling agent, the General Services Administration (GSA). The OCDM will use part of its new funds to buy metals and minerals for the DPA inventory which had its origin in the Korean war. It will also reimburse the Department of Agriculture for any foreign-produced materials that agency acquires by the barter of surplus farm products.

On March 31 this year, stocks in the DPA inventory included 657,713 s. tons of aluminium, 135,780 s. tons of copper, 81,300,991 lb. of nickel, 79,814,281 lb. of tungsten and 2,384,463 l. dry tons of metallurgical manganese.

The passage of the Supplemental Appropriations Act was supposed to clear up confusion over stockpile disposals, both from the DPA inventory and from the national stockpile of strategic minerals. A spokesman for the House Appropriations Committee, however, declared flatly that this had not been accomplished. But approval has relieved fears that the OCDM will be forced to sell this fiscal year some of its DPA stocks because, with the new funds, no disposals will have to be undertaken until at least July 1, 1960 or later.

The House and the Senate endorsed the position of their Appropriations Bill Committees when they passed the supplemental bill and another measure—the Independent Offices Appropriation Bill. These committees contended that there were materials worth $8,156,210,000 in stockpile inventories, whereas stockpile goals set by the OCDM called for materials valued at only $4,125,000,000 and, therefore, there were over $4,000,000 worth of materials " in excess of stockpile goals " and that steps should be taken to eventually dispose of the excess supplies.

To sell from the DPA inventory, the OCDM does not need authority from Congress but the agency has always held that such disposals, if undertaken, should not damage market prices unduly

nor harm producers and consumers of the commodities to be sold, whether in the United States or abroad. In April this year the OCDM announced plans to sell not more than 5,000 tons of copper each month from DPA stocks. But the Senate quickly passed a resolution frowning on the proposed copper sales and in May the OCDM dropped its plans to sell.

Sales of stocks from the national stockpile, however, must first be approved by Congress and the OCDM must wait for six months before starting any sales, thus giving the trade time to adjust to any planned disposals.

Meanwhile, to add to the uncertainties, Mr. Leo Hoegh, the director of the OCDM, told the Joint Congressional Committee on Defence Production on Tuesday (August 18) that there may not be such huge amounts of "excess" supplies in the stockpile as Congress thought. He also said a new study of stockpile requirements was being undertaken by the OCDM and the Defence Department but results would not be known for about a year.

" Generally, a stockpile for a limited war would be adequate," he stated. " One of our important current activities is to determine the role of stockpile materials in relation to general war with nuclear attack, including the problem of post-attack recovery. While both supply and consuming facilities for the materials would suffer severe damage from nuclear attack, the availability of basic materials would play a major role in getting the wheels of industry turning again after attack. In addition, rapidly changing technology may result in new requirements for high temperature alloys and other special purpose materials. Arrangements have been made with responsible agencies to follow these developments closely. It may be necessary to make allowance in the objectives to meet new demands for these purposes."

Mr. Hoegh noted that the goal of a five-year supply for every material in the stockpiles had been reduced in 1958 to a three-year supply level but this was not necessarily the final answer.

OCDM estimates that the current market value is slightly over $7,000,000,000 for all materials in Government inventories. The material that might be considered excess is believed to be between $2,000,000,000 and $3,000,000,000, but the requirements for nuclear and post-attack recovery have been further studied, though no precise figure can be given. " Disposal of any part of this excess," it was stated, " would have to be in accordance with present policy . . . of not causing serious economic disruption and, in the case of strategic and supplemental stockpiles, would require reference to the Congress."

Mr. Hoegh also said that the OCDM was considering asking Congress for some new legislation " designed to make the management of all the materials in government inventories more flexible and businesslike ". He added that a draft of the proposed legislation had not yet been completed but declared it was under consideration by various agencies of the Federal Government and " we hope that we will be able to submit it to Congress in the near future ".

A bill providing for the extension of the U.S. barter programme has been approved by the Committee on Agriculture of the House of Representatives and awaits the decision of the House as a whole. It contains new provisions authorizing acceptance of domestic as well as foreign produced minerals and ores in exchange for agricultural surpluses. Domestically produced material was not previously eligible for barter. It is considered that the proposed bill is likely to encounter strong opposition in the House, as well as from the Administration.

Meanwhile the White House continues to be under pressure to set up an established national policy for the maintenance of domestic minerals production. The House of Representatives has approved a resolution to this effect, which would be the forerunner of an attempt in the 1960 session to aid the lead-zinc industry, as well as other mineral producers, who have been compelled to cut back production since the termination of government buying programmes. The House held that the depressed condition of the domestic industries had been brought about by Government policies and increasing imports, and that future policy should be based upon higher U.S. output and less dependence on offshore supplies.

ANGOLA'S RECORD DIAMOND OUTPUT

The record production of 985,643.69 ct. of diamonds was achieved during 1958, states the Comphania de Diamantes de Angola in its annual report. To this there was added 15,592.35 ct. collected during prospecting and developing operations, making a total of 1,001,236.04 ct., which is about 16 per cent greater than the output for 1957. Of this total 59.31 per cent were gem stones and 40.69 per cent industrial diamonds.

Throughout 1958 mining operations proceeded satisfactorily, resulting in a larger volume of soil being removed and of gravel being treated than in any previous year. The total volume of soil removed was 9,263,404 cu. m. with an average density of 4.84 m. or 10 per cent greater than the figure of 8,386,780 cu. m. for 1957. Of the total, 38.4 per cent was moved by mechanical excavators, 33.1 per cent by hydraulic processes and 28.5 per cent by manual shovels ; the corresponding percentages for the year 1957 were 36.5, 22.2 and 31.3 respectively. The average output per man per day was 14.08 cu. m. compared with 12.83 cu. m. for 1957 and 14.20 for 1956, which latter figure is the highest for any year. The number of excavators in use during the year was nineteen, as in the previous year. In the previous report it was mentioned that it was intended to order nine more " draglines " but in effect only three were ordered, two from England which have arrived recently at Dundo and one from Western Germany which is just arriving at the mines. With the experience gained from these machines after they have been put into commission, decisions will be taken regarding the type or types of additional machines to be acquired. The amount of gravel treated was 2,341,055 cu. m., not including some thousands of tons of previously rejected gravel retreated, giving an average yield of 0.42 carats per cu. m. This exceeds by about 12 per cent the corresponding figure for 1957 of 2,096,253 cu. m. with an average yield of 0.41 carats per cu. m. For the first time in the history of the company more than one half of the total quantity of gravel treated (about 51 per cent) was collected mechanically.

At the end of the year there were twenty-two mechanical excavators employed solely for the treatment of gravel, and recently this number has been increased by two shovels of English manufacture which, with the two draglines from the same manufacturers, should soon be erected and start working. The average amount of gravel treated monthly by each native labourer in 1958 rose to a record figure of 21.31 cu. m. ; for the previous four years the figures were 1957, 20.28 cu. m., 1956, 20.36 cu. m., 1955, 15.25 cu. m., 1954, 14.97 cu. m.

The Luachimo Hydro-Electric Central Station which continued to function throughout the year, supplied practically all of the electric energy used in the mine workings with a production for 1958 of approximately 18,119,000 kWh.

Prospecting operations have continued to be carried out by missions numbering up to thirteen at times in the different districts of the territory with results which will lead to further operations in certain districts. Special reference is made to the discoveries in the hydrographic basin of the Cuango where some new small pockets were found between the rocks lining the banks of that river, containing very small but rich deposits of gravel, the average yield of which attains 100 and even 200 carats per cu. m. In 1958, from these pockets 14,400 carats of diamonds of a good average size and, in the majority of cases, of good quality were collected.

On the other hand, development work carried out in deposits previously discovered has resulted in four new areas being included in the reserves, the total capacity of which has been computed at about 464,000 cu. m. of gravel containing approximately 468,000 carats of diamonds.

Exploration work was carried out as usual throughout the year, both in these and other adjacent areas. Soundings have been made continuously in different districts with interesting results in some places.

Further evidence of kimberlite formations was found during the geological studies, all of them being in the Luachimo basin so that the total number of these is now nineteen with the thirteen which had been discovered previously.

The programme of exploration established for 1959 provides for the treatment of 2,097,800 cu. m. of gravel containing 825,850 carats of diamonds, but at the time of writing it is evident that, failing unforeseen occurrences, these figures will be considerably exceeded. The company expects that the production for 1959 will exceed 920,000 carats or even 930,000 but it is highly improbable that the figure for 1958 will be reached.

POLAND'S COAL MINES SET THE PACE

In recent years Poland's industry has suffered from a very low productivity level and poorly co-ordinated development schemes. Critical statements from the Government and from Prime Minister Gomulka himself have repeatedly contained the complaint that unit productivity is far below that of Western European countries and that Poland must produce harder to keep up with the rest of the world. These efforts of the State are at last meeting with some success—in the case of the minerals producing industry a marked one.

It is the country's coal industry which is setting the pace in this field. In the first half of last year productivity per man-shift in the Polish underground and opencast coal mines stood at only 1,298 kg., or 30 kg. less than in 1949 ; by the end of the first half of this year this figure had risen to 1,359 kg. With the return to earlier productivity levels and their surpassing, total coal output over the six-month rose by 4.4 per cent on that for the similar period of last year to a half-yearly total of 49,150,000 tonnes. This progress is of particular satisfaction to the Polish authorities as last year's output—some 94,981,000 tonnes in all—was only 0.9 per cent up on the 1957 total. By 1965, it was announced recently, annual coal production is to reach 111,500,000 tonnes annually. Production of coke, Polish exports of which increased by 7.5 per cent over last year, also continues to increase.

Brown coal is being developed under a long-term development scheme with 1975 as target year. Recent geological surveys state that the country's brown coal deposits total 36,000,000,000 tonnes ; of this, however, only 3,500,000,000 tonnes have been discovered and only between 2,400,000,000 and 2,500,000,000 tonnes can be mined economically. Eastern Germany recently announced a grant of 400,000,000 roubles to Poland for the purchasing of machinery and opencast mining equipment.

Iron ore extraction continues at a growing tempo. Despite this, however, and the fact that a long-term expansion programme is being worked through apparently successfully, Poland's iron ore deposits are insufficient for home demands. Even by the end of the plan period only 19 per cent of all iron ore used by Polish industry will have come from native sources. Iron and steel production is nevertheless rising at a remarkable rate. Next year's steel output will be at 6,400,000 tonnes, approximately treble that for 1949 ; by 1975 targets of 13,000,000 tonnes of raw steel, 10,800,000 tonnes of pig iron and 8,800,000 tonnes of rolled steel products are planned.

During the first half of the year a new copper works was completed and brought into operation at Liegnitz. This is described by Polish sources as a plant of extreme importance to the country's economy. Some fifty copper extraction units and items of drilling plant are to be delivered to Poland by the Soviet Union within the next four years.

Aluminium production this year will be well above that for 1958, owing to the start of operation at the Gorka aluminium plant. The Skawina plant, only a few miles away, continues to produce 25,000 tonnes of aluminium annually. Both plants are in the Cracow area and near the country's major steelworks at Nowa Huta, large-scale extensions to which were completed within the past few months.

Zinc output in the half-yearly period totalled 83,300 tonnes. Some 40 per cent of the country's zinc production, current statistics show, now consists of electrolytic zinc. Five production plants are in operation, all in the Katowice area. They are Szopienice, with an annual output of 80,000 tonnes, Boleslaw (40,000 tonnes), Welnowice (25,000 tonnes), Lipiny (20,000 tonnes) and Kunegunde (15,000 tonnes). Some 45,000 tonnes of the Szopienice output and all of the Boleslaw production are taken up with electrolytic zinc. A sheet galvanizing plant worth 2,400,000 dollars is to be delivered to the Lenin works from the United States. Deliveries will start this year and the plant be in action by 1961.

Poland's lead production fell last year to 35,000 tonnes—from 35,700 tonnes in the previous year and 35,200 tonnes in 1957.

RAW MATERIALS FOR INDIA'S NUCLEAR PROGRAMME

India will be entirely self-sufficient technologically by the end of the second Five-Year Plan in the production of basic materials for the generation of atomic power, according to a recent statement by the Prime Minister, Mr. Nehru.

The plant designed and constructed by the staff of the Atomic Energy Establishment at Trombay had successfully produced nuclear grade uranium metals, said Mr. Nehru, and these would be used in the production of fuel elements for the reactors now under construction. This plant could be expanded to produce enough uranium metal for the first nuclear power station. The chemical engineering division was now in a position to design any larger nuclear grade uranium metal plant.

In Bihar, a sufficiently large deposit of low grade uranium ore had been located to justify the setting up of a uranium mill to produce uranium concentrate in adequate quantities for a medium-sized nuclear power station. The process for this plant, with necessary data, is being developed in Bombay and will be ready shortly.

Promising deposits of uranium have also been located in Rajasthan, but their extent has not yet been sufficiently established to justify the setting up of a plant. Exploratory drilling for uranium ores has been started recently in the uranium-bearing rocks of Salem district in Madras State.

A plant to treat the used fuel of the Canada-India reactor and other reactors and extract plutonium therefore is being designed by the engineering division of the Trombay Establishment and is expected to be completed within about two years.

The production of heavy water in the fertiliser heavy water plant at Nangal is expected to commence before the end of the second Five-Year Plan period. Additional production of heavy water by other methods is being considered in the proposed fertiliser plant at Trombay.

Expansion at Mount Isa

AUSTRALIA is the leading producer of mine lead in the free world, and the third in zinc production. In copper it is sixth behind the U.S.A., Chile, Rhodesia, Canada and the Belgian Congo. Mount Isa Mines, as the producer of more than two-thirds of Australia's copper and one-quarter of its lead, must be regarded as one of the most important sources of these metals in the free world.

Daily ore production at Mount Isa last April was 7,100 tons ; by late June it was 7,500, still rising. Total ore won in 1958-9 was 2,250,000 tons, an increase of 600,000 over the preceding twelve months. In 1959-60 production is expected to exceed 3,000,000 tons.

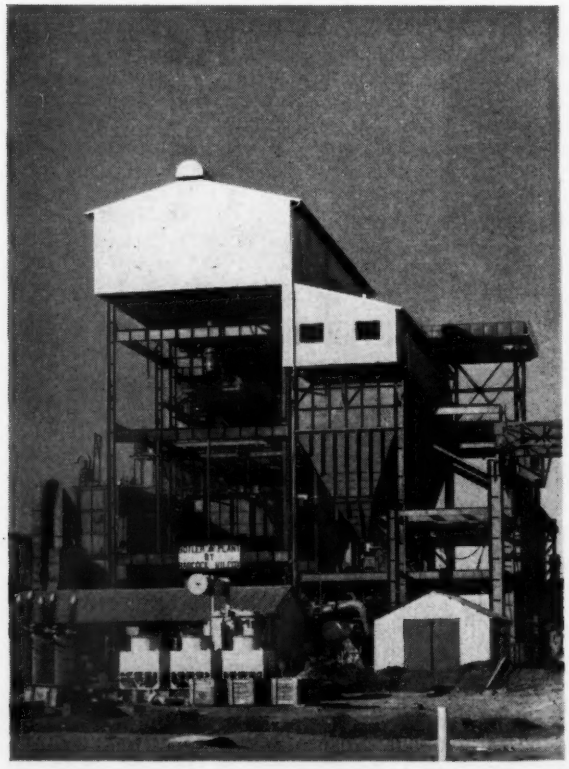
The Expansion Programme

Mt. Isa Mines has already built a copper refinery in Townsville which started operating in June this year. The refinery has an initial capacity of 30,000 tons of refined copper and is designed to produce 60,000 tons at full capacity.

Immediate expansion plans, based on an ore production rate of 8,000 tons a day, allow for an annual production of 70,000 tons of copper, 50,000 tons of lead, 25,000 tons of zinc and 4,500,000 ounces of silver. Detailed metal production figures based on a daily ore production of 14,400 tons have not yet been worked out.

As part of the expansion programme, the company decided to sink a new ore shaft with as great an ore-haulage capacity as any deep underground mine shaft in the world. The shaft will be equipped to lift 800 tons of ore an hour from a depth of 3,000 feet, twice the capacity of the present shaft.

Costing several million pounds, the new shaft will take at least five years to sink and equip, and will more than double Mount Isa's present ore-haulage capacity. The larger of its two cage hoists will carry 160 men each trip and will

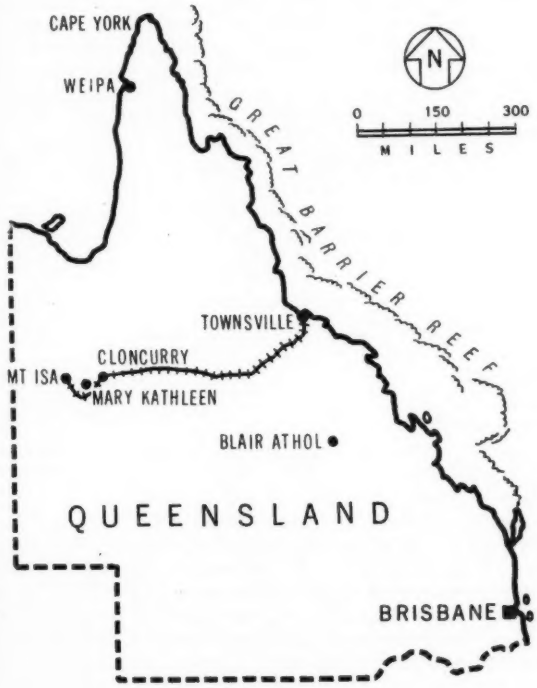


The £20,000,000 expansion programme at Mount Isa Mines is now well under way. Due to be completed in 1963, the programme has included the construction of a new 60,000 kW power station (right). Another major project is the replacement of the present smelter (above) without interfering with production. Mount Isa's isolation, illustrated in the map opposite, has meant transporting heavy equipment needed for the station and smelter from Adelaide, a distance of more than 1,700 miles, on a specially designed road-rail vehicle

be capable of carrying the 20-ton 3 ft. 6 in. guage electric trolley locomotive now being installed for underground haulage. It will have a comfortable capacity to handle the target production figure of 14,400 tons a day.

Other important expansion projects include a new power house of 60 megawatt capacity which is expected to generate 30 megawatts by December this year ; 500 new houses for extra staff ; and a new rock-fill dam to store 17,000 million gallons of water.

A new copper smelter will be built on the site of the present one without break in production. The new stack for the smelter will tower 500 feet above the hill behind the smelter, 200 feet higher than the present stack. A new mill is planned and a whole hill—1,000,000 cubic yards of rock and earth—is being moved to provide a level site. One of the more



important installations in the mine has been the 84-in. by 60-in. underground crusher.

Isolation a Major Problem

A major difficulty ever present in the development of Mount Isa is its isolation. Mount Isa is 600 miles from Townsville, the nearest seaport, 1,000 miles from Brisbane the capital of Queensland, and 1,700 miles from Adelaide, the capital of South Australia. The link with Townsville is by a railway originally intended to transport cattle. Because this line is too light to carry heavy rolling stock at reasonable speeds, transport is slow and costly. Efforts are now being made to find money to reconstruct the rail line—a project vital to Mount Isa's future development.

All Mount Isa's recent expansion has been financed from its own earnings and reserves. Over 70 per cent of its total earnings have been ploughed back and only 28 per cent has been paid in dividends. Although the company decided on the present expansion activity in a period of high metal prices, the subsequent substantial decline in world prices has not upset the programme. Indeed, apart from yielding more metal for sale, the expansion has resulted in a big reduction in the cost per unit of metal and thus enabled the company to counter successfully the depressed metal prices.

Japanese Interest in South African Minerals

(from Our Own Correspondent)

South African base mineral producers, many of whom have been experiencing rather dismal times for some time past, are now being cheered by the appearance of Japanese interest in various metals and minerals in the southern part of the continent. Hopes are thus rising that quite a substantial export trade may be built up. The first indications of this was the buying of iron and steel products from the S.A. Iron and Steel Corporation totalling some 173,000 short tons. This has been followed up with contracts for the supply of iron ore which are expected to build up to around 30,000 tons a month from a small mining company — Leeuwbosch Lead — which has an iron ore deposit near Rustenburg in the Transvaal, worked on a tribute basis.

According to reports here, Japanese industrialists are interested in a nickel prospect, near Bindura in Southern Rhodesia, which is controlled by an Anglo-Transvaal subsidiary — the partners being Anglovaal, Middle Wits and Rooderand — and the possibility is that this will be opened up, the Japanese concern guaranteeing mining costs.

Negotiations are also reported to be taking place for the purchase of antimony from Cons. Murchison. Japan has been a buyer even before World War II, subsequent to her Chinese supplies being cut off, but the suggestion here is that she may participate in the market to a markedly increased extent.

The Japanese commercial section of its South African consulate state that a large purchasing mission will be visiting this country in the near future to investigate the possibility of arranging for supplies of raw materials for Japanese industry — particularly in respect of mineral products. Although nothing official has been said so far, the suggestion is being canvassed that the mission may well be interested in ferromanganese from the big Cato Ridge plant now being commissioned. As this is only a short distance from Durban, it might provide profitable business for both sides.

One group that is hoping that something will turn up are the asbestos miners. Although the big groups, such as Cape Asbestos and Turner and Newall are doing quite well, the others with only one or two exceptions have been going through very thin times. Over-production took place on a relatively large scale, particularly in the case of crocidolite, and the market turned very selective. Hopes existed at one time that a barter agreement with the U.S. would help, but contracts did not come the way of smaller producers.

If Japan should become a buyer, producers will have to keep a close watch on supplying to specifications. Regrettably, South African asbestos undertakings have not won themselves a particularly good reputation on the marketing side in the past. During the post-war asbestos boom, criticism by overseas consumers was fierce.

Chrome producers are also wondering whether their exports to Japan cannot be increased. They have been running on a small scale in the past. Over the past year stocks have built up greatly, partly through the decline in demand but also as a result of poor rail communications which prevented exploitation of the post-war boom. Here, also, hopes of benefits of a U.S. barter deal were not fulfilled, in so far as smaller undertakings were considered.

Japan is currently a buyer of quite a range of minor minerals —including sillimanite, fluorspar, vermiculite, beryllium, cadmium and lithium. The question now being asked is whether trade in these and others can be built up.

Straits Tin

In this article our Malayan correspondent analyses the export and supply position of Straits Tin

PAN-MALAYAN exports of tin metal in the first half of 1959 at 20,541 long tons slightly exceeded the exports in the last half of 1958 at 19,844 tons, but failed to equal the figure of 25,970 tons in the first six months of that year.

The accompanying table shows, in l. tons, the comparative figures over the past 3½ years of the exports to the seven countries which were the principal purchasers of " Straits Tin " in pre-depression 1956.

The U.S. continues to be far the most important purchaser of Malayan smelted tin, taking 56.06 per cent of the exports in 1956. The ratio dropped to 51.15 per cent in 1957 and slumped to 39.14 per cent in the first six months of 1958, but picked up to 47.82 per cent in the second half, to give a percentage of 42.96 for the whole of 1958. The recovery continued into 1959, and in the first six months of the present year the U.S. took 54.89 per cent of the total tin metal exported.

It will be seen that the exports to Japan, India and Italy held up well throughout the depression years of 1957 and 1958. On the other hand exports to France have declined sharply, and exports to the Netherlands and to the United Kingdom dropped to zero in the later part of 1958.

The last export of tin metal by Malaya to the Netherlands was 75 tons in April 1958, the only shipment during that year. The Netherlands has turned to the U.S.S.R. as its principal supplier of tin metal. In 1956 it imported only 10 tons of Russian tin, but in 1957, 3,799 tons were imported from that source, stepped up to 7,434 tons in 1958 and 2,422 tons in January to April this year.

The large increase in exports to the United Kingdom during 1957 and early 1958 coincides with the period during which the Buffer Stock Manager was making heavy purchases. The subsequent falling off indicates that the demand for " Straits Tin " on the London market is being met from Buffer Stock liquidation.

The smelters in the Federation of Malaya and Singapore, the producers and exporters of the tin metal branded as " Straits Tin ", process tin concentrates received from other countries besides those won in the mines of the Federation.

During 1958 their supplies of tin-in-concentrates came from:

	Tons
Mines in the Federation of Malaya	33,018
Burma	1,785
Thailand	8,806
Laos	623
Other countries	37
TOTAL	44,269

In the first six months of 1959 tin-in-concentrates reached the smelters from the following sources :

	Tons
Mines of the Federation of Malaya	15,993
Burma	691
Thailand	4,072
Laos	203
Other countries	146
TOTAL	21,105

At the end of June the stocks of tin metal and tin-in-concentrates held in the Federation and Singapore totalled 13,096 tons of which 8,567 tons were held on mines or with ore buyers, leaving 4,429 tons with smelters or on wharves awaiting shipment.

The allotment to the Federation of Malaya of permissible exports in the third quarter of 1959 is 9,437.5 tons, compared with 7,500 tons in the first quarter and 8,625 tons in the second quarter. Thailand has also received an increased allotment of 2,200 tons in the third quarter, against 1,670 tons and 1,920.5 tons in the first and second quarters respectively. Burma, Laos and the other countries which send concentrates for smelting in the Federation and Singapore are not members of the International Tin Agreement.

On the assumption that the permissible export amounts for the fourth quarter will remain unaltered, the supply position of " Straits Tin " for the second half of 1959 would appear to be :

	Tons
From the mines of the Federation of Malaya	18,875
Burma	600
Thailand	5,000
Laos	200
Other countries	150
APPROXIMATE TOTAL	24,725

Stocks with smelters and on wharves are unlikely to change appreciably; therefore the probable availability of " Straits Tin " in the second half of this year will be between 24,000 and 25,000 tons or some 16 per cent in excess of the exports in the first half of the year, which accords with the International Tin Council's assessment of the percentage increase in world demand for tin in the period.

Mine Production

In 1956, the mines of the Federation produced 62,294 tons of tin-in-concentrates. Production fell to 59,293 tons in 1957 and in 1958, the first full year of restricted exports, production declined to 38,458 tons. Production continued to fall in the first half of the current year, in which output was 17,183 tons. There is an adequate labour reserve to man any foreseeable production increase.

PRINCIPAL PURCHASERS OF STRAITS TIN

	1956	1957	1st half 1957	2nd half 1958	Year 1958	1st half 1959
U.S.A.	41,083	36,116	10,265	9,420	19,685	11,275
Japan	6,888	6,744	3,250	3,753	7,003	3,540
Netherlands	4,265	1,762	675	32	707	—
Republic of India	3,758	4,223	2,008	2,419	4,427	1,597
France	3,577	2,202	1,316	452	1,768	171
Italy	2,835	2,520	1,155	1,150	2,305	1,095
United Kingdom	1,984	6,532	3,565	14	3,579	—
All Other Countries	8,886	10,505	3,736	2,604	6,340	2,863
TOTAL	73,276	70,604	25,970	19,844	45,814	20,541

Metallurgical Technology in the U.S.

This summary of some major developments in U.S. metallurgical technology during 1958 is extracted from a review by Earl T. Hayes, chief metallurgist, Bureau of Mines, U.S. Department of the Interior, which will be a chapter of Vol. I, Minerals Yearbook, 1958. *Preprints are available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price 5 cents.*

THE modern blast furnace is a thing of metallurgical beauty and without parallel for producing large quantities of useful material at low cost; not even the most optimistic claimants of alternative reduction methods forecast its demise. It must be realized, however, that today's blast furnace costs $40,000,000 to $50,000,000 and the erection of 50 of these in the next 15 years to pace U.S. physical and economic growth will require tremendous expenditure. This realization spurred the blast furnace people to improve existing equipment by increased use of self-fluxing sinter, richer iron ore feeds to the furnace, wider use of oxygen, and changes in pressure and composition of the blast; with these improvements it appeared that the 1940 blast furnace could be made to produce 50 per cent more metal by 1960.

Dollarwise, the greatest development taking place in any sector of American metallurgy continued to be the developments in iron ore preparation and steelmaking. An old process in steelmaking — the use of oxygen rather than air in the converting step — continued to expand.

What appeared to be a great economic problem a few years ago has now been solved because oxygen of over 99 per cent purity can be produced for a price near $5 per ton in 500 t.p.d. plants. Such a plant costs about $3,500,000 and will make enough oxygen to produce 5,000 tons of steel a day.

Use of Cyclones

The use of cyclones for classifying and dewatering continued unabated as the greatest contribution to minerals beneficiation of the past 30 years. The cyclone is a cylindro-conical classification unit utilizing centrifugal force in place of gravity. The material to be treated, suspended in a carrying fluid, is pumped tangentially into the short cylindrical section. This sets up a spiral stream downward around the walls of the cylinder and in an attached cone. Force causes the larger and heavier particles to move toward the outside of the stream; the finer and lighter material is forced into the vortex. As the stream moves down the cone and the velocity increases, the action becomes intensified. The heavier particles leave the cyclone through an opening at the apex; the light material passes upward to an overflow orifice through a pipe that extends into the upper end of the vortex. This pipe, known as the vortex finder, prevents short circuiting of the stream in the cylindrical chamber. The size and shape of the cyclone, as well as the diameter and length of the vortex finder, influence the action of the unit. The variables used for control of the operation, however, are the diameter of the apex opening and the velocity (or pressure) of the feed stream.

Wet and dry cyclones are identical in principle; only the carrying fluid is different. When a cyclone is used as a heavy-medium separator the material to be treated is suspended in a slurry consisting of water and a dense solid of small particle size. The effect of the centrifugal force is thus reduced and only dense particles discharge through the apex opening.

Descriptions of the Moa Bay-Port Nickel project began to appear in the technical Press. This gigantic undertaking will process 25,000 s. tons of nickel and over 2,000 s. tons of cobalt a year from Cuban laterites. When completed, this will be the largest plant using autoclave leaching. The technique of leaching ores under conditions of elevated temperature and pressure has developed rapidly in the last few years and along with solvent extraction is the greatest development in hydrometallurgy of the past decade. Pioneering plants by Sherritt-Gordon at Fort Saskatchewan, Alberta, at a nickel-cobalt-copper refinery and Calera (Chemical Construction Co. process) at Salt Lake City, Utah, on cobalt ores have demonstrated the commercial feasibility of the process. The plant at Moa Bay, Cuba, dwarfs all previous efforts. The leaching of the raw ore is done with sulphuric acid at intermediate temperatures and pressures in banks of autoclaves 40 ft. high. Finally, an intermediate nickel-sulphide product is precipitated.

The metal sulphides will be transported in a unique tanker to Port Nickel, La., where they will be processed to produce nickel and cobalt metal. An interesting sidelight of this process is that considerable quantities of the modern metal, titanium, are required to withstand the corrosive action of sulphuric acid under these conditions. Some seven miles of titanium tubing and $250,000 worth of titanium valves were used in constructing this plant.

An interesting development in utilization of pyrrhotite was announced by International Nickel Co. during 1958. The first unit to treat some 350,000 tons a year of pyrrhotite ore contained the world's largest reduction kiln. It is 180 ft. long, with a dia. of 13 ft., and operates at 1,600 deg. F. This produces a feed of two 550-ton-a-day fluid bed units. A gas rich in sulphur dioxide goes to a sulphuric acid plant and a high grade (about 68 per cent Fe) iron oxide product is obtained.

During the year seven producers of the so-called rare earths initiated a research and development programme at Battelle Memorial Institute. The Bureau of Mines produced some of the world's first high-purity cerium at its Reno, Nev., station by electrowinning processes from fused-salt baths. Not all the problems in this area were those of technology, because considerable education is needed to show that many elements in this group were not rare and were ready for development by the technological entrepreneur.

Problem of Technical Literature

It became evident that the handling of metallurgical literature was bigger than any single technical problem. It was not that the industry was complacent, because abstracts the world over give metallurgy the best coverage of all industries; however, with the amount of new information doubling every 7 to 10 years, the task facing a new researcher in the field or an old researcher attacking a new problem and reviewing all past work is indeed formidable. An increasing number of conventions and frequent articles in the technical Press were devoted to this subject and it appeared that the accumulation, filing, and dissemination of metallurgical information henceforth would receive the same attention as some of the glamorous parts of metallurgical technology.

MINING MISCELLANY

The Iraqi Government is at present negotiating with the U.S. firm, Texas Gulf Sulphur, for the exploitation of sulphur deposits in the country.

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It is announced from Bogota that the Government of Colombia is to start exploration of a virtually unknown part of the South American republic. The area, which is flanked by the Sierra Nevada de Santa Maria and the Magdalena River, is believed to be rich in iron ore, copper, coal and mineral oil.

★

Minas de Ore de El Callao, in which the Venezuelan Government holds an 89.25 per cent interest, has increased its capital to 6,000,000 bolivares (9.36 - 9.40 bolivares = £1) and plans to step up its output of gold. El Callao accounts for 98 per cent of Venezuela's total gold production.

★

An agreement has been signed between the province of La Pampa, Argentina, and the National Atomic Energy Commission for prospecting and exploration with a view to the discovery of nuclear minerals. The agreement is for a period of five years and will be automatically renewed for similar periods, unless notice of termination has been given by either party. The province will allocate technologists from the Mines Department to the search for radioactive minerals, while the A.E.C. will provide detectors and other prospecting equipment, together with technical instruction in its use. Participation by private interests in the investigation will be encouraged. The agreement also lays down conditions for the exploitation or reservation of any deposits which are found.

★

The output of quicksilver at the Idria Mine, in Yugoslavia, one of the biggest producers in Europe, has been steadily increasing throughout the year. During the first four months it amounted to 152 tonnes, being higher by 27 tons or 22 per cent than in the corresponding period of 1958. A similar increase is believed to have occurred in subsequent months and it is anticipated that by the end of the year the mine will have realized its 1959 production plan of 500 tonnes.

★

Extensive deposits of manganese have been discovered in the vicinity of one of Yugoslavia's oldest copper and zinc producers, the Novo Brdo mine in Serbia. Payable reserves are placed at about 500,000 tonnes. Exploration is reported to be almost completed and it is anticipated that exploitation will soon be started.

★

A Swedish steel firm is reported by Barclays Bank D.C.O. to be interested in large deposits of iron ore known to exist within a radius of 90 miles of Lusaka, Northern Rhodesia, which may contain from 3,000,000 to 10,000,000 tons of ore with more than 66 per cent iron. These deposits, which are centred mainly to the south-east and some 15 miles east of the town, are the subject of a report by the Director of Geological Survey. The report emphasizes that much work remains to be done on surveying the deposits and that new ones may yet be discovered.

★

The Indian rare earths factory at Kalamassori, South India, is likely to be reopened, pending finalization of certain formalities by the management of the company. This factory, a joint venture of the Government of India and the Kerala Government designed to exploit the monazite sands of the Kerala coast, was closed down on April 3 following a strike.

★

The Pakistan Government has decided to centralize all activities in connection with minerals under a new Bureau of Mineral Resources. It will incorporate the Geological Survey Department and the Petroleum and Minerals Department, and will be responsible for mineral development policy. The new Bureau will be under a Director General with Joint Secretary status. The first Director General is Mr. S. M. Yusuf. Mr. C. Harvey Richards, who is on a Colombo Plan assignment with the Pakistan Government, has been attached to the Bureau as Mining Adviser.

★

The Compagnie Miniere du M'Zaitu, Chile, has informed the Chilean Government that it intends to reopen its copper smelting plant at Chagres next March. It plans to increase annual production from its mines to 27,000 tonnes of copper by 1962 and to 40,000 tonnes by 1965. The company will invest $7,500,000 in these projects.

★

Philippine Iron Mines, Inc. has asked the National Economic Council to authorize the barter exportation of its entire excess production instead of an annual quota of only 20,000 tonnes. In a letter to the N.E.C. chairman, the company described a reported plan to grant a uniform quota of 20,000 tonnes to each of the various iron producers as unfair, stating that it produced eight times as much as all the other iron mines combined. There has, however, been no confirmation that the Council is considering a system of quantitatively uniform quotas. According to sources reported to be reliable, Council thinking tends to favour a qualitative restriction which would prohibit the exportation under barter of ore with an iron content exceeding 56 per cent, on the ground that higher grade ores would be needed at home for the projected Philippine steel industry.

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According to *Pravda*, annual coal production in the U.S.S.R. will reach 600,000,000 - 612,000,000 tons by 1965, representing a gain of 21 - 23 per cent over last year's output. To achieve this increase, new underground and opencast mines capable of yielding 200,000,000 - 220,000,000 tons a year are to be commissioned during the current seven-year development plan, in addition to reconstruction of existing mines.

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Nickel-ferrous ore reserves of the Ferrum Exploration and Development Co. on the island of Homonhon, some 400 miles south-east of Manila in the Philippine Republic, are estimated by the company at 3,000,000 tons. It is stated that the reserves, valued at about £10,700,000 sterling, are sufficient for at least 20 years of continuous mining operations.

PERSONAL

Mr. John Norman Davies has been appointed a director of Tronoh Mines Ltd.

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Mr. Robert G. LeTourneau has been selected by the U.S. military's joint Chiefs of Staff to receive the 1959 National Defence Transportation Association's Award. The award, scheduled for presentation on October 14, identifies Mr. LeTourneau as the person " whose achievement contributed most to the effectiveness of the transportation industry in support of national security." Mr. LeTourneau spent more than six years developing a revolutionary " electric wheel " system for powering ultra - heavy - duty equipment (*vide The Mining Journal Annual Review* 1959, pp. 113 and 115). He also designed the world's largest rubber tyres (10 ft. tall and 4 ft. wide), which are now in wide use on equipment built by his firm, R. G. LeTourneau, Inc.

★

Powell Duffryn Ltd. have agreed with the newly formed Mining Machinery Manufacturers' Export Association that the company will release Mr. D. G. Hemmant, the managing director of their international consultancy organization, Powell Duffryn Technical Services Ltd., for a period of up to one year from September 1, to take up the appointment of Acting Director of the Association. Mr. Hemmant has in consequence resigned his directorship of Powell Duffryn Technical Services Ltd., and his full-time services for the period will be directed towards developing the Association in its early stages. Mr. Hemmant's temporary release from his duties with Powell Duffryn Technical Services Ltd. has been made by the parent company in the full recognition of the potential importance of the Association in developing mining machinery exports. During Mr. Hemmant's absence Mr. R. Turner, chief engineer of the company, will be acting managing director.

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Mr. F. W. Stokes has been appointed a director of Powell Duffryn Carbon Products Ltd.

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Mr. G. B. Perry has been appointed managing director of Axia Fans Ltd., a member of the Hall-Thermotank group of companies. He has also been appointed a director of Vent-Axia Ltd., and will retain his seat on the board of Thermotank Ltd. As a result of Mr. Perry's appointment, Mr. R. C. Adie has been promoted to general manager of Thermotank's International Products Division and Mr. H. J. Watson will be general manager of the engineering division.

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Mr. Keith Allison, a member of the conveyor and belting section of the Goodyear Industrial Rubber Products Development Department for the past three years, has been appointed Industrial Rubber Products Sales Manager for the Goodyear Tyre and Rubber Co. of India Private Ltd., at Calcutta.

Machinery and Equipment

Determining a Fracture Zone

A general survey of the various aspects of research into the problem of rockbursts in South Africa since 1952, together with the results so far obtained, have been discussed in a paper, *Review of Recent Research into Rockbursts and Strata Movement in Deep Level Mining in South Africa,* by H. G. Denkhaus, F. G. Hill, and A. J. A. Roux. This paper was submitted to the Association of Mine Managers of South Africa, and has been reproduced in *Bulletin of The Institution of Mining and Metallurgy*. Of particular interest is the brief description of the ultrasonic pulse reflection method to determine the depth of a fracture zone around excavations.

A barium titanite crystal, which acts at the same time as transmitter and receiver of ultrasonic energy waves, is mounted on a probe rod introduced to a selected depth into a borehole drilled into the face. Part of the ultrasonic energy transmitted is reflected from cracks and discontinuities in the rock, part passes through them. The more cracks that are present in the vicinity of the hole, the more the energy that will be reflected. The pattern of reflected pulses, displayed on the screen of an oscilloscope, is therefore a measure of the degree of fracture of the rock in the plane perpendicular to the axis of the hole at the position of the transducer.

Three zones of rock can be distinguished, namely, a fracture zone, a transition zone (in which only a few single cracks are present) and a zone of solid, unfractured rock. The operator of the instrument can observe immediately, by looking at the screen, how far the ground in the vicinity of the transducer is fractured and therefore, by moving the transducer in the hole, determine the position of the boundaries between the fracture zone, a transition zone (if any) and the solid ground. The instrument is effective to a range of 5 ft. The only disadvantage of this method is that a diamond-drill hole is required to ensure sufficient contact between the transducer crystal and the rock.

Preliminary tests with this method were a success, and the research team is at present modifying the instrument to make it waterproof and more handy for use underground.

COMPREHENSIVE MINING CATALOGUE

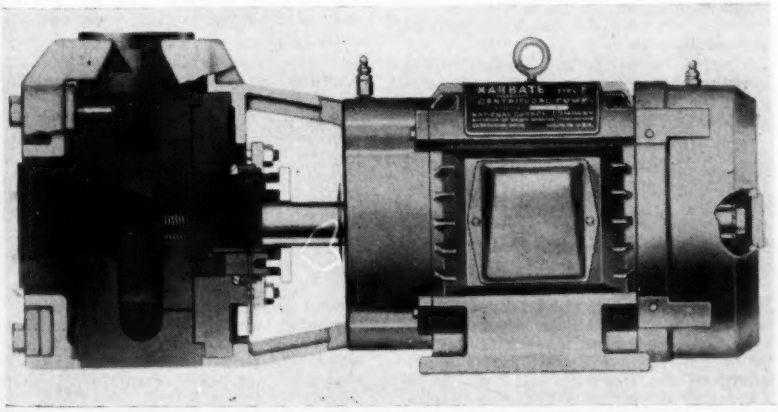
A new catalogue of the mining equipment made by Victor Products (Wallsend) Ltd., has lately been published by the manufacturers. Included are notification of drills of all types together with drilling accessories, support gear, electrical equipment and all other units produced by the company. The value of the catalogue is enhanced by the list of district offices and overseas representatives included.

NEW CORROSION-RESISTANT PUMPS

Three new sizes of corrosion-resistant centrifugal pumps—two with nearly twice the capacity of present models—have been added to the line of Karbate impervious graphite pumps available from Union Carbide International Co., Division of Union Carbide Corp. Increasing use of this motor-mounted type F pump in both the chemical and metal finishing industries has created a demand for a greater capacity range, both in terms of total head and gal.-per-min. ratings.

Known as models 22-FAL, 28-FAL, and 31-FAL, the new pumps are equipped with 1-, 1½-, and 2-h.p. 1,750 or 1,450 r.p.m. motors. At 1,750 r.p.m., the latter two types can deliver up to 150 g.p.m as compared to a top of 80 g.p.m. for previous type F Karbate impervious graphite pumps.

Cutaway of typical pump mounted to motor



The two larger pumps are available with 3- or 5-h.p. motors for handling fluids of higher specific gravity than water. Maximum total head for each of the news types operating at 1,750 r.p.m., is 33, 51, and 67 ft. respectively (10.1, 15.5, and 20.4 m.); at 1,450 r.p.m. maximum heads are 22, 34, and 45 ft. respectively (6.7, 10.3, and 13.7 m.).

The almost universal corrosion-resistance of Karbate impervious graphite pumps make these low-cost units ideal for a wide range of applications, and permits an appreciable reduction in inventories through the standardization of pumps and replacement parts.

A NEW TOOL FOR BLASTING

Most users of ammonium nitrate and fuel oil have found that this explosive has some shortcomings, namely, lack of water resistance and the inability to shatter hard rock. With these shortcomings in mind, the Iron Ore Co. of Canada, asked Dr. M. A. Cook, of the University of Utah, to formulate an explosive that would be water resistant and would have the ability to shatter hard rock.

Experiments were started in the latter part of 1956 to accomplish this end. To date a number of interesting explosive compositions have been developed that are water compatible and will shatter hard rock. Results so far obtained have been presented in *Mining Congress Journal*.

In conjunction with the development of a new series of AN explosives, a primer was designed that is better suited for bulk AN mixtures. Extensive study has determined that the detonation pressure developed by the primer is the most important factor when boostering relatively insensitive high content AN explosives. Referring to the hydrodynamic theory of detonation the explosive pressure of the booster is equal to its density times one-quarter the detonation velocity squared. In other words, explosives of high density and high detonation velocity develop high pressures which make them well suited as AN boosters.

The most satisfactory material the company has found for these boosters is 50/50 cast pentolite. This booster is cast to form a cylinder 2 in. in dia. by 2 in. long. The booster weighs about 165 gm. (about 6 oz.). The cylinder is cast with two ¼-in. holes for the purpose of allowing 50-grain primacord to be threaded through the middle and tied. These pentolite boosters have a density of 1.63 and are relatively insensitive.

The new explosive is a slurried mixture of ammonium nitrate, TNT and water. (Patent applied for.) These slurries can be procured through the explosive manufacturers, and can utilize AN in any of its commercial fertilizer forms. Prilled AN requires 20 per cent TNT and 15 per cent water. The mixture has a density of 1.4 When using a coarse-fine mixture of AN, the water content can be reduced to 14 per cent by increasing the TNT content to 21 per cent. The density of this mixture is also about 1.4. When using high density AN made either in a graining kettle, tower or by the Stangel process, the water can be reduced to 13 per cent and the TNT to 18.5 per cent. This slurry mixture will have a density of 1.55. All these mixtures have an unconfined critical diameter of less than 6 in., and require a minimum booster of 80 gm. of tetryl or equivalent.

The usable size range of the TNT for

these slurries can vary from four mesh to as fine as 30 mesh, Tyler screen size. There are now TNT pellets on the market that fall within these size ranges. The product best suited for these mixtures is a shot tower TNT with a grain size of minus 10 to plus 14 mesh. Flaked TNT can be used but it requires more water in the mixture to make the slurry. This causes a lower density explosive. Fine grained TNT can be used, but 15 per cent more must be added. When using this fine grained TNT the critical diameter and minimum booster is increased considerably.

The detonation rate of the slurry is about twice that of the AN-fuel. The explosion pressure for slurry, which in turn reflects borehole pressure, is over three times that of the AN-fuel mixture.

The slurry has the consistency of a very thick pea soup. It can be poured down dry boreholes and, of course, completely fills the hole. It should be pointed out that if the borehole leaks and the water runs out of the mixture, the borehole pressure is reduced about 30 per cent. To overcome this problem a water flow retarder can be added to make the slurry thick enough so that the water will not run off. Another convenient way to overcome this problem is by loading the material in a polythene or other leak proof sack. Handling of sacks does add to the loading costs, but by retaining the water in the slurry the full borehole pressure is developed. In wet boreholes or those having standing water, the slurry can be pumped or blown by air through a large hose to the bottom of the hole. This pumping or blowing is similar to a pneumatic grout placing operation. Again, as in the dry hole, the mixture can be placed in a bag and dropped through the water. If the hole is water-filled, the bag can be made of porous or water disintegrating material. The only requirement of the bag is to carry the slurry mixture down through the water without allowing segregation of the AN and TNT.

Assuming the cost of AN is 4 c. per lb. and TNT 22 c. per lb., the slurry costs 1.75 times more than the AN and fuel oil. When using slurry for blasting hard rock or wet holes the company found it was possible to increase the spacing and burden. The increased spacing and burden produced 1.7 times more broken rock per ft. of borehole. In some cases the same powder factor had to be maintained with the increased spacing. The fragmentation in hard rock has been considerably better with the slurry than with the AN-fuel mixtures. In hard rock drilling the additional cost of the slurry has been more than offset by the savings made in drill bit cost per yd.

RESONANCE SCREENS FOR COAL AND ORES

The Don Valley "Westfal" resonance screens manufactured by Don Valley Engineering Co. Ltd., use the established principles of resonance screening. Applications in the coal industry include raw coal screening up to 500 t.p.d., primary classification up to 350 t.p.d., clean coal classification and dewatering up to 250 t.p.d., slurry dewatering and classification of coke up to 150 t.p.h. In ore preparation and other industries, applications include pre-screening, coarse screening, classifying, secondary screening, and dewatering.

Resonance screens are claimed as being particularly useful in large and heavy screening installations of high capacity and output. They operate at high intensity and the field of application ranges from large size screening to the screening of fines. Two or more screen frames can be assembled in line to operate as one complete unit.

The resonance screens consist of a screen tray resiliently mounted on a weighted balancing frame through the medium of rubber buffers and Lignostone laths. The direct weight of the tray is carried on static buffers fitted with tensioning devices. The drive is through a totally-enclosed, roller bearing-mounted eccentric having an adjustable elastically coupled connecting rod attached to a fabricated bracket riveted to the tray, with the driving shaft supported in roller bearing plummer blocks mounted on the balancing frame and having a grooved pulley for vee rope drive. The balancing frame is suitably weighted to reduce its movements to a minimum and is mounted on resilient rubber pads to prevent the transmission of vibrations into the supporting structure. Normal screen width range from 2 ft. 6in. to 8ft. and frame lengths from 8 ft. to 24 ft.

The principle of operation is the interaction between two or more oscillating masses through resilient couplings of special design and material. The drive unit is elastically connected to the screen tray and requires very little power to bring the tray into full oscillation even when starting up under load. To maintain oscillation very little power is required other than that needed to overcome friction losses.

MALAYAN TIN'S NEW DREDGE

Malayan Tin Dredging Ltd., has furnished the following technical details of their new dredge, Dredge No. 4A which was put into operation at Kampong Gajah, Perak, on July 28, by the pressing of an electric button by the Mentri Besar of Perak.

The dredge was designed by F. W. Payne and Son, of London. It has an assumed capacity of 400,000 cu. yds. a month. It is powered by electricity, with an installed h.p. of 2,001. The hull is 296 ft. 4 in. in length, 70 ft. wide and 12 ft. 4in. deep at wellside, 11 ft. 10 in. at shipside. The ladder is 211 ft. measured from centre, with a maximum digging depth of 130 ft. The bucket line has 133 18 cu. ft. buckets on band speeded at 24 per min. Twenty-eight 4-cell endflow primary jigs and 4 Yuba Richards secondary jigs are installed.

Technical Briefs

Activation and Deactivation Studies with Copper Sphalerite

Using Cu_{64} as a radiotracer, Gaudin, Fuerstenau and Mao have shown that sphalenite activation depends on a chemical exchange of Cu^{++} for Zn^{++} in the sphalerite lattice. The exchange is said to be rapid until three layers of zinc have been replaced after which the exchange is controlled by the parabolic law.

By measuring the amount of copper taken up after different lengths of time and knowing the amount required to form a monolayer, it was possible to estimate how deep the replacement had penetrated. (As the doclecahedral cleavage face has two cationic sites per unit and knowing the unit dimension of the crystal lattice together with the specific surface of the sample the uptake per gram can be calculated.) It appears that the surface sites and the adjacent site are involved in rapid replacement and that after between 15 and 30 minutes of contact the third layer is replaced. After the third layer the uptake of Cu^{++} (y) in micromoles per gram is given by the following relationship to time. $y = 0.165\ t^{1/2} + 0.82$.

Deactivation is somewhat different and is slower but it is clear that the Cu^{++} is not removed as fast as it replaces Zn^{++}. Neither cyanide nor copper-cyanide complex is absorbed but apparently complex the cupricion so that the reaction $Zn\,S + Cu^{++} \rightarrow Cu\,S + Zn^{++}$ moves to the left. Furthermore a concentration of Zn^{++} will obviously assist the reaction and explains its use in some selective flotation operation.

It is also shown that peopylenediamine and ethylenediamen inhibit the uptake of Cu^{++} but are not completely effective.

CONCENTRATING SULPHIDE ORE

Air-float or pneumatic tables are frequently employed in the final dressing of tin alluvial concentrates but are rarely used as a means of concentrating sulphide minerals. For this reason an account of the treatment used by Allied Chemical Corp., at its Gosan Mines, near Galax, United States, which appeared in a recent issue of *Engineering and Mining Journal* is worth consideration particularly where water is scarce as it combines the use of air tables for dealing with all plus 48-mesh material with flotation for the finer sizes.

By so doing it is claimed that it is possible to treat a comparatively coarse product, is relatively inexpensive and saves water.

The ore consisting of about 65 per cent pyrrhotite in a gangue of chlorite, muscivite, biotite, feldspar and quartz is crushed to ¼ in. and slip into four fractions of 3 to 8 mesh, 8 to 20 mesh, 20 to 48 mesh and −48 mesh by screening. The three coarse sizes are treated on these tables simply making a concentrate and tailing. The −48 mesh fraction is pulped in a conditioner, coarse pyrrhotite removed in a Denver jig before passing to flotation. In the flotation section one unit cell is employed to float mica after which the pulp is conditioned with the reagents and the residual pyrrhotite floated.

Metals and Minerals

Wolfram's Recovery Gains Momentum

The recent upward movement in wolfram ore shipment prices was sharply extended on September 1, when quotations were raised by 7s. 6d. per unit, bringing the price range up to 110s.-115s. A further advance of 5s. took place on Wednesday to 115s.-120s., making a rise of over £1 in the past three weeks, and it is considered possible that the market may go even higher. Demand is reported to be on a much broader scale, not only from Europe but also from the Far East, notably Japan. The U.S. is also stated to be becoming more prominent as a buyer.

The main factor behind the latest increase is an improved demand from special steelmakers in Sheffield, which in turn reflects the recovery in the machine tool industry. The price of wolfram has been rising, though more gradually, for the past three weeks, and apparently some of the steelmakers decided after last Monday's increase of 2s. 6d. a unit to make sure of adequate stocks before the ore became more expensive.

Quite a lot of Continental demand has been reported, but the amount of business done is being limited not only by the shortage of materials but also by sellers holding for higher prices, which has, of course, contributed to the physical shortage of ore. The substantial European stocks which were a drag on the market some months ago have been considerably reduced.

Earlier this year, the U.S. made quite big purchases from Europe, in addition to which there were large Belgian requirements of up to some 400 tons of ore spread over several months against part of a West German defence order for tungsten carbide.

Japan is still believed to be seeking supplies in Europe which normally she would buy from countries nearer at hand such as Thailand, Korea and Burma. Production in these countries has been severely curtailed as a result of the drastic fall in prices.

The price of wolfram is almost double what it was a year ago, when it was quoted at 60s.-65s. a unit, though it still has a long way to go before it reaches the level ruling at the beginning of 1956, when quotations stood at 272s.-276s.

The short-term outlook for producers will obviously be influenced by the duration of the steel strike in the U.S. Having regard, however, to the encouraging prospects for industrial expansion in Western Europe and Japan, it seems reasonable to anticipate that tungsten's recent firmness will be fully maintained, more especially in vew of the steep fall in the production of wolfram and scheelite that has occurred. At worst, the steel strike should only have a temporary effect on U.S. consumption of tungsten, since the backlog of orders should keep steelworks operating to capacity for some considerable time once normal working is resumed.

The upward movement in price, if continued, must in due course bring its own corrective by leading to an increase in available mine capacity in the U.S. and elsewhere, the economic limit for most of the producers now closed down being not much in excess of 100s. a unit. But it should be remembered that there is necessarily a time-lag before shutdown mines can be restored to production.

SILVER IN NEW YORK

Large silver consumers in the U.S. have had to make purchases from the Mint to meet their full requirements, supplies from leading domestic refiners having largely been cut off by labour troubles. A strike of lorry drivers in the San Francisco area made it impossible for buyers to obtain bullion from the U.S. Mint in that city, forcing them to go to the Mint at Denver, Colorado. This resulted in a ¼ c. increase in the price to 91⅞ c. per f.oz.

This strike has now been settled, pickets being withdrawn after Union members approved a new two-year contract. Lorry operators were expected to resume normal operations on September 1. This should permit a resumption of purchases from the San Francisco Mint and presumably should result in the withdrawal of the ¼ c. increase.

LITHIUM CONTRACT CANCELLED

The Lithium Corporation of America, Inc., has informed Quebec Lithium Corporation that the raw materials purchase contract between the two companies had been terminated, and that it will not accept any further deliveries of lithium ore concentrates from Quebec Lithium. In making this announcement, the U.S. company added that it intended to resume the mining and use of its own North Carolina ore in 1960, when the present inventories of concentrates and raw ores would have been exhausted.

In Montreal the Quebec Lithium Corporation was reported as stating that its contract with the Lithium Corporation of America, Inc., was firm and contained no escape clauses. Under this contract, it was maintained, the U.S. company is obligated to purchase, take delivery and pay for 17,000 units of spodumene concentrates monthly up to March 1, 1961. Each spodumene or lithia unit weighs 20 lb. Shipments to the Lithium Corporation of America have been accounting for about 90 per cent of Quebec Lithium's total production.

TANTALUM/NIOBIUM IN THE U.K.

In his statement to shareholders of Murex Ltd., the chairman, Sir Arthur Smout, stated that the company's new tantalum/niobium plant had been substantially completed, and that certain sections were already in operation. He added that, although the sales of tantalum products were higher than in the previous year, no imports of tantalum powder were necessary and the requirements of the fabrication departments were met from the company's own resources. Competition from both Europe and the U.S. was keen and selling prices fell substantially. The demand for pure niobium was slight, although there is a growing interest in the metal from research and development groups. The company is well equipped to meet any future requirement.

During the closing months of the financial year Murex experienced an increased demand for pure molybdenum and the new molybdic oxide plant was able to achieve a high level of activity. The results, as regards both the purity of the product and the costs of production, were described as extremely satisfactory.

WORLD MAGNESITE OUTPUT

World production of crude magnesite in 1958 increased by 5 per cent above that of 1957, according to the Bureau of Mines, U.S. Department of the Interior. The world total for 1958 is estimated at 5,900,000 s.tons compared with 5,600,000 s.tons in 1957 and 3,800,000 s.tons in 1954. The world's largest producer was again Austria with 1,346,133 s.tons (1,292,567). For the tenth successive year the U.S. was the second largest producer, but its output at 492,982 s.tons decreased 27 per cent in quantity and 26 per cent in value below 1957.

HIGH PURITY GOLD

To meet special requirements of the electronics industry, American Smelting and Refining Co. has begun production of high purity (99.999 per cent plus) gold at its Central Research Laboratories. Commercial gold (99.98 per cent) normally contains a total of about 200 p.p.m. of impurities such as copper, silver, platinum and palladium. Asarco's high purity gold contains a total of 10 p.p.m. or less of these elements. The high purity gold is priced at $50 per troy oz.

FALCONBRIDGE REACHES A NICKEL TARGET

Production at Falconbridge Nickel Mines' smelter in Ontario and refinery in Norway during the second quarter of 1959 reached the rate needed to pass the target of 27,500 s.tons of nickel annually, set in 1953. In a half-yearly report to shareholders, the company's president, Mr. H. J. Fraser, said that production during the second quarter was at an annual rate exceeding this target. Since commercial demand for the company's products continues strong, a substantially higher production level is expected for the second half of the year.

ORDERS FOR INDIAN MANGANESE

The Deputy Minister of Commerce and Industry, Mr. Satish Chandra, is reported from New Delhi as stating that the State Trading Corporation had received orders for the export of 1,100,000 tons of manganese ore in the next 12 months.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

Price movements during the last six days have been of a relatively minor nature with the undertone of all four markets being good. In general, business has been at a low ebb, whilst merchants and consumers sit back and try and assess all the factors at present influencing the metal markets.

RISE IN COPPER BACKWARDATION

The copper strike in the U.S. continues and prominent individuals on both sides are expressing the opinion that its duration may extend beyond the end of September. So far there have been no signs of any extraordinary buying, except for some parcels which have been bought for shipment to America to arrive before the possible dockers' strike on the 30th of this month. This movement has caused the backwardation on the London Metal Exchange to increase in spite of a further rise in stocks in official warehouses of 266 tons, bringing the total on Monday morning to 15,994 tons; it is expected that there should be a substantial decrease in the stocks during the next two weeks.

Apart from the slight movement in the Metal Exchange price and a corresponding one on Comex, the only major price movement reported has been that the American Metal Climax have recommenced offering copper at 33 c. per lb., which is approximately in line with the price at which dealer copper has been changing hands. The negotiations between the Mine Mill Union and the American Metal Climax were brought to a satisfactory conclusion, which means that the smelter at Carteret remains in production; both sides of the industry, however, emphasize that this settlement has little bearing on the main dispute.

It is understood that negotiations in Chile between the Braden Copper Co. and workers are continuing and that the general opinion is that a settlement will be reached before the current contract expires at the end of September, as it is pointed out that the Anaconda Co. have already reached agreement for their Chilean properties.

The London Metal Exchange announced that, with effect from all prompts falling due on and after January 1, 1960, a new standard copper contract would apply. This new contract differs from the one now in use only in the fact that the discount on copper cathodes is reduced from £3 to £1, whilst the discount for class B Fire Refined Copper 99.88 per cent remains unchanged at £3 per ton, and in future these two grades will be classified separately.

TIN MARKET AWAITS QUOTA DECISIONS

At the time of writing the International Tin Council is in session and, as is to be expected, the market is quiet awaiting the outcome. It is generally expected that the export quota for the last quarter of the year will be substantially increased above the 25,000 tons permitted for the third quarter but that there will be no other alterations. It is generally believed that the Buffer Stock Manager has had to sell very heavy tonnages over the last few weeks to maintain the price at its present level, and that had it not been for the sales of British Government metal he would have disposed of more than 50 per cent of his stock of 23,500 tons. In view of this there is a difference of opinion as to whether further sales will be made to keep the price at its present level until the increased quotas take effect or whether a temporary rise in the price will be permitted. Stocks of tin in official warehouses on Monday morning showed an increase of 362 tons at 8,253 tons.

On Thursday the Eastern price was equivalent to £814⅞ per ton c.i.f. London.

U.S. LEAD/ZINC QUOTA SYSTEM OPPOSED

The lead and zinc markets remain uninteresting with turnovers down to a very low figure and, as far as can be seen, there is very little to alter this picture. In the U.S. the threatened strike against the Bunker Hill Co. has been postponed until September 15 by both sides agreeing to work continuing on a day-to-day basis. Some premiums on the higher grades of zinc have been increased and now stand at 1¼ c. per lb. for high-grade zinc and 1½ c. per lb. for special high-grade zinc.

An interesting development, as far as the international markets are concerned, is the publishing of a statement by six of the major U.S. lead and zinc smelting companies opposing the present quota system and recommending that they be rescinded and replaced by higher duties, the main contention being that the smelting operations are hindered by the impossibility to import sufficient foreign ores which is endangering the ability of the smelting industry to continue. Quite obviously an opinion coming from such a quarter must be seriously considered and should its contentions be accepted, the whole pattern of the lead and zinc markets of the world might be substantially altered. The first information as to the reception of these proposals is that the U.S. Interior Secretary has rejected them.

Closing prices are as follows:

	Aug. 27 *Buyers*	*Sellers*	Sept. 3 *Buyers*	*Sellers*
COPPER				
Cash	£235¼	£235½	£235¾	£236
Three months	£233¾	£234	£234	£234¼
Settlement	£235½		£236	
Week's turnover	12,525 tons		10,275 tons	
LEAD				
Current ½ month	£71⅛	£71¼	£71½	£72
Three months	£73⅛	£73⅜	£72½	£73
Week's turnover	5,450 tons		5,300 tons	
TIN				
Cash	£792½	£793	£792	£792½
Three months	£792½	£793	£792	£792½
Settlement	£793		£792½	
Week's turnover	505 tons		620 tons	
ZINC				
Current ½ month	£85½	£85⅝	£85⅛	£85⅞
Three months	£84½	£84⅝	£84⅛	£84⅜
Week's turnover	5,425 tons		4,425 tons	

LONDON METAL AND ORE PRICES, SEPT. 3, 1959

METAL PRICES

Aluminium, 99.5%, £180 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Crude (70%) £190 per ton
Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit, c.i.f.

Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 9s. 0d. lb.
Cerium (99%) net, £16 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 14s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram.
Gold, 250s. 9d.
Iridium, £23/£25 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% - 98%) £245/£250
Magnesium, 2s. 3d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £21/£23 oz. nom.
Osmiridium, nom.
Palladium, £6 10s./£7 10s.
Platinum U.K. and Empire Refined £28 10s oz
Imported £26½/£27½
Quicksilver, £71½ ex-warehouse
Rhodium, £41/£45 oz.
Ruthenium, £18/£20 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 78⅛d. f. oz. spot and 78⅛d. f'd
Tellurium, 18s. lb.

ORES AND OXIDES

Bismuth		30% 5s. 0d. lb. c.i.f. 20% 3s. 3d. lb. c.i.f.
Chrome Ore—		
Rhodesian Metallurgical (semifriable) 48%	(Ratio 3 : 1)	£15 15s. 0d. per ton c.i.f.
„ Hard Lumpy 45%	(Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
„ Refractory 40%		£11 0s. 0d. per ton c.i.f.
„ Smalls 44%	(Ratio 3 : 1)	£14 0s. 0d. per ton c.i.f.
Baluchistan 48%	(Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b
Columbite, 65% combined oxides, high grade		nom.
Fluorspar—		
Acid Grade, Flotated Material		£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)		156s. 0d. ex works
Lithium Ore—		
Petalite min. 3½% Li_2O		40s. 0d./45s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O		40s. 0d./45s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O		£25 0s. per ton f.o.b. Beira
Magnesite, ground calcined		£28 0s./£30 0s. d/d
Magnesite Raw (ground)		£21 0s./£23 0s. d/d
Manganese Ore Indian—		
Europe (46% - 48%) basis 57s. 6d. freight		nom.
Manganese Ore (43% - 45%)		nom.
Manganese Ore (38% - 40%)		nom.
Molybdenite (85%) basis		8s. 11d. per lb. (f.o.b.)
Titanium Ore—		
Rutile 95/97% TiO_2 (prompt delivery)		£29/£30 per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO_2		£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)		115s. 0d./120s. 0d. per unit c.i.f.
Vanadium—		
Fused oxide 95% V_2O_5		8s./8s. 11d. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65 - 66% ZrO_2)		£16/£17 ton c.i.f.

Mining Finance

Western Areas: Next Kaffir Flotation

Last Tuesday Johannesburg Consolidated Investment announced that the South African Minister of Mines had agreed to grant a lease over 2,230 claims of its "Western Areas prospect". The formula for lease consideration payments will be $Y = 12.5 - \frac{75.}{x}$. Arrangements are in hand for the incorporation of a company, to be called Western Areas Gold Mining, which will take cession of the lease from Johnnies.

For a mine not yet floated, a surprisingly large amount is already known about Western Areas. The original drilling programme, completed some 2½ years ago, defined a compact area probably underlain by some 68,000,000 tons of ore payable in terms of cost levels at that time. Eighteen boreholes were completed within this compact area, all of which intersected reefs. Sixteen encountered payable values, the average being 558 in./dwt. (9.3 dwt. over 60 inches.)

Of the 68,000,000 tons of ore believed to be present, about three-quarters is contained in the Elsburg Series with an average value of about 8.5 dwt., the remainder being rather richer ore from the Ventersdorp Contact Series. It is thought that after dilution and other losses, the yield from run-of-mine ore might be about 5½ - 6 dwt. This would give revenue of 72s. per ton, and with costs at say 50s. per ton, the profit margin would be around 22s. per ton. This is, of course, a narrow margin on which to float a mine, and it must be assumed that the intention will be to make Western Areas a large tonnage producer.

Technically, the mine should be a fairly straightforward operation. Much of the ore is shallow, while the reefs are both wide and concentrated in a fairly small area, making them amenable to selective mining. If this technique is employed to any extent, the mill grade might be raised substantially, while the probable ease of extraction might make 50s. an over-estimate of cost levels.

All in all therefore, it looks as though Western Areas will be a large-tonnage, low-cost medium grade producer, after the model of, say, East Geduld. This type of mine is the backbone of the South African mining industry, and although it would be wrong to expect Western Areas to make quick and spectacular profits, it has every chance of a long, prosperous and uncomplicated life.

Among the companies which will be interested in the new flotation to a greater or lesser extent are Rooderand Main Reef, Free State Development, and Anglo-Rand, apart, of course, from Johnnies itself.

COLUMBITE NO LONGER A CINDERELLA

Columbite is at present performing one of the about turns which have been both sharp and frequent in its short history. Demand, especially for the better grades, has revived, and Bisichi, one of the most important producers, was able to announce last week that its output is now sold well into 1960. Because of this, Bisichi's directors believe that the 1958 dividend of 15 per cent can be maintained for 1959 on the capital as increased by the proposed one-for-five issue.

One by-product of this improving situation for columbite would appear to be the suggested merger of United Tin and Ribon Valley. These two companies own two-thirds and one-third interests respectively in an area known as the Odegi leases. This is an area of "great potentiality" situated about a day's motor journey from the mines' headquarters. Small scale production has been carried on for some time, but higher demand for columbite and increased tin quotas would make it possible for the area to be exploited on a larger and more profitable scale by the two companies in amalgamation.

Other and equally important reasons for the merger are the joint interest in prospecting operations for alluvial gold in Northern Nigeria, and the strictness of tin restriction in Nigeria, under which the combined quotas of the two companies amount to less than Ribon's own production in a normal year.

If the merger is ratified by the shareholders of the two companies, the opportunity is to be taken to write down the United Tin capital by two-thirds. Ribon Tin shareholders would receive one "new" U. Tin share for every three Ribon Stock units of 2s. 0d., so that of the final capital of 836,666 shares, present U. Tin shareholders would hold 400,000 and present Ribon Valley holders 400,000. This seems to be an eminently fair basis.

BETTER TIMES AHEAD FOR BERALT

The preliminary profit figures of Beralt Tin and Wolfram, published as we went to press last week, are sombre indeed. There is, nevertheless, some compensation for shareholders in the fact that the figures mark the low-spot of a bad period — in the five months since Beralt's books closed the market for wolfram has taken a distinctly better turn.

This being so, the figures for the 1958-9 financial year are of no more than historical interest. For the record, the net loss after taxation and depreciation was £95,706, compared with a profit in the preceding year of £104,337. With a result of this kind it would hardly be surprising if the dividend were passed, but in view of the improvement in the wolfram market, the board has recommended a token distribution of 20 per cent, against 90 last year.

It is possible that the results for the current year will show a quite dramatic turn-round. For much of the 1958-9 year the price of wolfram was around the 70s mark, whereas the current year has seen an unspectacular but steady improvement to the current level of over 110s. per unit. On the basis of 1957-8 production, an increase in the average price received from 70s. to 100s. per unit would improve Beralt's annual income by some £120,000, or still more if production were to be

LONDON MARKET HIGHLIGHTS

Gold shares failed to make much headway during the past week. For one thing a certain amount of end-Account profit taking held prices in check. But a more unsettling factor was a week-end Press comment which advised holders of St. Helena to take a profit on their shares. This they did with the result that on Monday the price fell 4s. to 79s. 6d. at one time. Johannesburg, on the other hand, was very happy to take any stock offered and by Wednesday "Saints" were 83s. 6d. again and many local investors were beginning to wonder whether the advice was so good after all.

The August Rand returns made a mixed showing but were generally satisfactory. President Brand again made the headlines with a new record monthly profit of £915,088, a rise of £263,000 on the earnings figure reported in December. Brand improved to 72s. 4½d. on the news. In the case of Harmony, however, profits were found to have fallen back after their recent steady advance and these shares eased to 42s. 6d. Most other Kaffir prices moved undecisively.

News that "Johnnies" have been granted a lease for the Waterpan area and the consequent expectation that a new gold mine, Western Areas Gold Mining, will be launched soon caused "Johnnies" to harden to 67s. Among the other companies to be concerned in the coming flotation, "Freddies" rose to 11s. 6d. Rooderand (6s. 6d.) improved on consideration of their big holding in "Freddies".

Tin shares maintained their new-found strength and high hopes were held that the current Tin Council meetings would recommend a substantial relaxation in tin output restrictions for the final quarter of 1959. Malayan (22s. 6d.), Tronoh (16s.) and Sungei Besi (11s. 9d.) all improved on earlier gains.

Nigerian columbite issues also came to life on a growing realization that the market for their heat-resisting metal is beginning to expand again. Among them, Amalgamated Tin of Nigeria moved up to 9s. 3d. Beralt shares provided one of their periodic bursts of activity. They dropped 3s. 9d. to 27s. 6d. following Friday's news of a sharp cut in dividend and a trading loss, but soon rebounded to 32s. 6d. when the price of wolfram moved ahead.

Copper shares again moved narrowly. Although it was recognised that the current U.S. strikes mean a high metal price for the Rhodesian and Transvaal producers, uncertainty about post-strike prospects for the metal made share buyers cautious. There was also a quiet air in the Lead-zinc market and even the ever-present Australian demand for Mount Isa (44s. 6d.) began to fade somewhat.

Elsewhere, Ashanti Goldfields jumped to 20s. 9d. following the August return which gave almost incredibly high gold development values ranging up to 132.5 dwt. per ton. The news imparted firmness to other Ghana gold issues despite Premier Nkrumah's statement that he was going ahead with plans to make the country a republic.

re-established at earlier higher levels. Beralt must also be reaping quite substantial benefits from the improved state of the tin market, and there should be the possibility this year of making a profit at least of the same order as last year's loss. On this basis, the stock units look quite interesting at their current price of 30s. to yield 3½ per cent.

RAND AND O.F.S. RETURNS FOR AUGUST

On the whole the August results reported by the South African gold mines make a satisfactory showing. Both Free State Geduld and Western Holdings announced strong advances in profits, while most of the other post-war mines at least equalled their July figures.

Perhaps the most disappointing result was that of Harmony, where profits fell by almost £30,000. Factors at work included a decline in throughput by about 7,000 tons and an increase in costs of 3d. per ton. Blyvoor was another Central Mining group producer unable to repeat the preceding month's level of earnings, although the decline here was only £11,500. Lower throughput and higher costs were again largely responsible.

On the brighter side, profits at Free State Geduld were boosted by a .2 dwt. increase in grade, an increase in tonnage to 91,000 and a slight reduction in costs, with the result that earnings jumped £29,000 to reach £570,657. A £17,000 rise in Western Holdings' outturn was attributable to a grade improvement from 12.2 to 12.4 dwt.

Another noteworthy result was announced by West Driefontein, where earnings reached a new peak of £776,928, with throughput at 99,000 tons. Saint Helena also reported record profits, the credit at this mine going to a slightly better yield.

Among the older mines, Durban, Crown and Robinson all suffered from slight grade reductions, but Simmer and Jack moved in the opposite direction, extracting almost .2 dwt. more from each ton put through the mill.

As a result of the pressure put on space by the recent printing dispute, it proved impossible to print our tables of Rand and O.F.S. results for the months of June and July. Publication will resume next week with a compilation from the August returns.

Malayan Tin's New Dredge.—Malayan Tin Dredging's new No. 4a dredge, the opening of which was reported in our issue of August 14, has made its way at flotation depth to a previously prepared face. The machinery, it is stated, is operating satisfactorily. The dredge has been granted an assessment under the control regulations, and it is expected that regular production will shorly commence.

Benguela Receipts Lower.—Net operating receipts of the Benguela Railway Co. in the first half of 1959 amounted to 78,671,000 Esc., compared with 98,549,000 in the corresponding period of last year. Tanganyika Concessions owns all the debentures and 90 per cent of the equity of the Benguela Railway Company.

Messina Dividends.—Messina (Transvaal) Development Co., will in future declare dividends in May and November, instead of April and October as in the past.

New Bid for Tin Fields of Nigeria.—On behalf of unnamed clients, Feuchtwangler (London) has made an offer of 8¼d. per share for the whole of the capital of Tin Fields of Nigeria. This compares with an abortive offer earlier this year of 6d. (from another source) and a middle quotation of 10½d. last week. Feuchtwangler's clients, it is stated, already own some 10 per cent of Tin Fields' capital.

Nchanga Capital Increase Approved.—At the annual meeting of Nchanga Consolidated Copper last Thursday, the resolutions authorizing the issue of 21,000,000 new shares were passed. The Johannesburg and Rhodesian Stock Exchanges have granted a listing as from September 15, and application has been made to the London Exchange for permission to deal from the same date.

Better Result From Marsman.—Operations of Marsman Investments in the year ended April 30 last resulted in a profit of £5,004 after all charges. This compares with a loss of £57,284 in the preceding twelve months, and reduces the debit balance carried forward to £186,552. Meeting, Manila, October 2.

El Oro's Good Year.—At £44,738 after tax, 1958 profits of El Oro Mining and Exploration show an improvement of more than £45,000 over 1957. Meeting, London, September 25.

BRITISH Company operating copper/silver mines at high altitude invites appiications for post of Assistant Manager. Applicants should have good qualifications and experience covering mining, metallurgy and geology. Working knowledge Spanish essential. Salary range $350-$400 per month plus bonus. Accommodation provided. Apply with copies references to Box C 659, Lee & Nightingale, Liverpool.

METALLURGIST/ASSAYER required for base metal mine in East Africa. Young mining school graduate preferred. Starting salary £1,200 p.a. inclusive; free accommodation; tours of duty 24 to 27 months; leave on full pay; free passages.

Apply in writing stating full particulars of age, qualifications and experience to Personnel Officer, Colonial Development Corporation, 33 Hill Street, London, W.1.

For Sale — One High Vacuum, High Frequency Melting Furnace, 30 kW. Unit has two Furnaces, one for Air Melting, the other for Ultra-High Vacuum melting. The Air Melting Furnace is a High Frequency Tilting Unit and will melt approx. 35 lb. Steel in 30 min. The High Vacuum Furnace has 15 in. Diffuser Pump, Backing Pump and will melt approx. 35 lb. Steel in 30 min. and will give Ultra-High Vacuum. The High Frequency Generator is a 30 kW. Metro-Vickers valve oscillator at approx. 200 kc. Equipment almost new, manufactured in 1952. Unit is ideal for experimental work or small production runs and is complete with Starters. Pumps, Control cubicles and Pipe Works, etc. Further details available on request. *Price* £1,250.

Davidsons Engineers (M/cr) Ltd., Irkdale Street, Smedley Road, Cheetham Hill, Manchester 8, Telephone No. COLlyhurst 1610.

DIRECTOR OF AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES, ADELAIDE, SOUTH AUSTRALIA

The Research and Development Laboratories of the South Australian Department of Mines are to be reconstituted as the Australian Mineral Development Laboratories, and will be controlled by a Council representing the Mineral Industry, the Commonwealth Government and the Government of South Australia.

The Laboratories are installed in modern buildings in Adelaide and are well equipped for integrated mineral research, including analytical, mineralogical, chemical, metallurgical and chemical engineering investigations from bench to pilot scale. One of the prime functions of the Laboratories will be to perform mineral investigations for industry on a contract basis.

Present employees number 130, including 75 professional officers.

Applications are invited for the position of Director of this establishment.

Duties—Responsible to the Council for the direction and administration of the Laboratories. The successful applicant will have considerable freedom in the selection of research programmes.

Qualifications—A University degree in Engineering or Science. Wide experience in mineral investigation and research. Experience in plant design and operation would be an additional qualification. The ability to direct and inspire research staff in the mineral development field is essential. Administrative experience is desirable.

Salary—Adequate salary will be fixed by the Council. It will be not less than £A4,250 per annum. Appropriate superanuation benefits will be provided.

Term — The period of appointment will be a matter for discussion between the successful applicant and the Council.

Accommodation — The Council will assist the successful applicant in obtaining suitable accommodation.

Removal Expenses — First-class fares and reasonable removal expenses to Adelaide will be paid for the successful applicant and his family.

Applications will be treated as confidential and should be addressed to — Agent General for South Australia, South Australia House, Marble Arch, London, W.1., England.

Closing date: October 16, 1959.

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This feature appears every fourth week

Book Reviews

Canadian Mines Handbook, 1959. *Published by Northern Miner Press, Ltd., 116 Richmond St. West, Toronto 61, Canada. Pp. 288. Price $3, paper bound, $5 with de luxe binding.*

The Canadian mining industry is adjusting itself to new conditions brought on by the recent recession. While many of the minor companies have been forced to curb activities, major organizations are widening their interests and are taking an increasing share of the financing and direction of new developments.

Leading the field are the major iron ore companies, such as Labrador Mining and Exploration, Quebec Cartier Mining Co., Pickands Mather and Co., and Iron Ore Company of Canada. Millions of dollars are being spent by these organizations in new rail lines, plants, towns and power sites, and all the other facilities required for fully integrated operations in undeveloped areas of Quebec and Labrador. Older areas are not being neglected either. Activities in the search for and development of new sources of iron ore have spread throughout Northern Saskatchewan, Ontario, and South-western British Columbia.

In a similar manner the efficiency of large scale planning and managemtent are evident in other segments of the industry, not only in development work but also in exploration activities. Gold, asbestos, nickel, copper, and other base metals all have a share in new developments. In Western Canada a whole new field has been opened up in the discovery and development of major potash deposits. Uranium, as previously predicted, moved into first place among the metals in 1958, with value more than double the previous year.

These are among the many facts that may be gathered from a careful study of the 1959 edition of the *Canadian Mines Handbook*, just published.

The new edition details activities of thousands of mining companies, and this year includes figures of production and profits for the first quarter, 1959, where available. More detail is also given on developments and exploration activities. As usual the *Canadian Mines Handbook* provides all essential statistical data, such as directors, capitalization, and financial position, of Canadian mining companies. Included, as in previous editions, are special sections: "Metal Mines Classified", in which producers of various metals are listed; the eight-year range of mining share prices; and a 28-page section of coloured maps.

The Geology of the Xeros-Troodos Area, *by R. A. M. Wilson. Published by authority of the Government of Cyprus as Memoir No. 1. With an account of the Mineral Resources, by F. T. Ingham. Pp. 184, with maps and index. Price £1.*

The authors are respectively geologist and director of the Geological Survey Department, Cyprus. The memoir deals with that strip of country extending from Zeros to the south of Mount Olympus, selected for mapping as it is this strip of country which contains most of the principal mines of Cyprus, as well as most of the different igneous rock types existing in the country.